

Claims

What is claimed is:

1. A method for use in free-space communications, comprising the steps of:

transmitting data in an active mode in an optical signal through a free-space optical path of a communication link extending across a terrestrial free-space region;

detecting degradation of the optical signal in the terrestrial free-space region; and

automatically switching from the active mode to a standby mode upon optical beam degradation in the terrestrial free-space region, wherein the standby mode includes transmitting data in a radio frequency (RF) signal through a free-space RF path of the communication link.

2. A method in accordance with claim 1, further comprising the step of:

communicating control and status information in the RF signal through the free-space RF path of the communication link.

3. A method in accordance with claim 1, wherein the step of detecting degradation of the optical signal in the terrestrial free-space region comprises the step of:

sensing a characteristic of a received optical signal.

4. A method in accordance with claim 3, wherein the characteristic of the received optical signal comprises a power level of the received optical signal.

5. A method in accordance with claim 3, wherein the characteristic of the received optical signal comprises a transmissive capability of the received optical signal.

6. A method in accordance with claim 3, further comprising the step of:

using the characteristic of the received optical signal to calculate a power adjustment for a station at an opposite end of the communication link.

7. A method in accordance with claim 1, wherein the degradation of the optical signal is due to atmospheric conditions in the terrestrial free-space region.

8. An apparatus for use in free-space communications, comprising:

means for transmitting data in an active mode in an optical signal through a free-space optical path of a communication link extending across a terrestrial free-space region;

means for detecting degradation of the optical signal in the terrestrial free-space region; and

means for automatically switching from the active mode to a standby mode upon optical beam degradation in the terrestrial free-space region, wherein the standby mode includes transmitting data in a radio frequency (RF) signal through a free-space RF path of the communication link.

9. An apparatus in accordance with claim 8, further comprising:

means for communicating control and status information in the RF signal through the free-space RF path of the communication link.

10. An apparatus in accordance with claim 8, wherein the means for detecting degradation of the optical signal in the terrestrial free-space region comprises:

means for sensing a characteristic of a received optical signal.

11. An apparatus in accordance with claim 10, wherein the characteristic of the received optical signal comprises a power level of the received optical signal.

12. An apparatus in accordance with claim 10, wherein the characteristic of the received optical signal comprises a transmissive capability of the received optical signal.

13. An apparatus in accordance with claim 10, further comprising:

means for using the characteristic of the received optical signal to calculate a power adjustment for a station at an opposite end of the communication link.

14. An apparatus in accordance with claim 8, wherein the degradation of the optical signal is due to atmospheric conditions in the terrestrial free-space region.

15. A method for use in communications, comprising the steps of:

transmitting data in an optical signal through a free-space optical path of a communication link extending through a terrestrial free-space region;

detecting degradation of the optical signal; and

transmitting data through a backup communication path in response to detected degradation of the optical signal.

16. A method in accordance with claim 15, further comprising the step of:

communicating control and status information in the backup communication path concurrently with the transmission of data in the optical signal.

17. A method in accordance with claim 16, further comprising the step of:

using the control and status information for switching data transmission from the free-space optical path to the backup communication path.

18. A method in accordance with claim 16, wherein content of the control and status information is set according to a communication protocol.

19. A method in accordance with claim 15, wherein the step of transmitting data through a backup communication path comprises the step of:

transmitting data in a radio frequency (RF) signal through an RF path of the communication link.

20. A method in accordance with claim 15, further comprising the step of:

updating a control packet based on an assessed characteristic of a received optical signal.

21. A method in accordance with claim 15, further comprising the step of:

determining whether or not there is detected degradation of the optical signal based on a control packet that is updated based on an assessed characteristic of a received optical signal.

22. A method in accordance with claim 15, wherein the step of detecting degradation of the optical signal comprises the step of:

sensing a characteristic of a received optical signal.

23. A method in accordance with claim 22, further comprising the step of:

using the characteristic of the received optical signal to calculate a power adjustment for a station at an opposite end of the communication link.

24. A method in accordance with claim 15, wherein the free-space optical path is subjected to atmospheric conditions.

25. An apparatus for use in communications, comprising:

means for transmitting data in an optical signal through a free-space optical path of a communication link extending through a terrestrial free-space region;

means for detecting degradation of the optical signal; and

means for transmitting data through a backup communication path in response to detected degradation of the optical signal.

26. An apparatus in accordance with claim 25, further comprising:

means for communicating control and status information in the backup communication path concurrently with the transmission of data in the optical signal.

27. An apparatus in accordance with claim 26, further comprising:

means for using the control and status information for switching data transmission from the free-space optical path to the backup communication path.

28. An apparatus in accordance with claim 26, wherein content of the control and status information is set according to a communication protocol.

29. An apparatus in accordance with claim 25, wherein the means for transmitting data through a backup communication path comprises:

means for transmitting data in a radio frequency (RF) signal through an RF path of the communication link.

30. An apparatus in accordance with claim 25, further comprising:

means for updating a control packet based on an assessed characteristic of a received optical signal.

31. An apparatus in accordance with claim 25, further comprising:

means for determining whether or not there is detected degradation of the optical signal based on a control packet that is updated based on an assessed characteristic of a received optical signal.

32. An apparatus in accordance with claim 25, wherein the means for detecting degradation of the optical signal comprises:

means for sensing a characteristic of a received optical signal.

33. An apparatus in accordance with claim 32, further comprising:

means for using the characteristic of the received optical signal to calculate a power adjustment for a station at an opposite end of the communication link.

34. An apparatus in accordance with claim 25, wherein the free-space optical path is subjected to atmospheric conditions.

35. An apparatus for use in communications, comprising:

an optical transceiver configured to transmit data in an optical signal through a free-space optical path of a communication link extending through a terrestrial free-space region;

the optical transceiver further configured to detect degradation of a received optical signal; and

interface circuitry coupled to the optical transceiver that is configured to send data through a backup communication path in response to detected degradation of the received optical signal.

36. An apparatus in accordance with claim 35, wherein the backup communication path comprises a radio frequency (RF) path.

37. An apparatus in accordance with claim 35, wherein the optical transceiver is further configured to update a control packet based on an assessed characteristic of the received optical signal.

38. An apparatus in accordance with claim 35, wherein the interface circuitry is further configured to determine whether or not there is detected degradation of the received optical signal based on a control packet updated by the optical transceiver.

39. An apparatus in accordance with claim 35, wherein the optical transceiver is further configured to use an assessed characteristic of the received optical signal to calculate a power adjustment for a station at an opposite end of the communication link.

40. An apparatus in accordance with claim 35, wherein the optical transceiver is further configured to transmit data in the optical signal through a free-space optical path of the communication link that is subjected to atmospheric conditions.

41. An apparatus for use in communications, comprising:

- an optical transceiver configured to transmit data in an active mode in an optical signal through a free-space optical path of a communication link extending through a terrestrial free-space region;

- the optical transceiver further configured to detect degradation of a received optical signal; and

- interface circuitry coupled to the optical transceiver that is configured to automatically switch from the active mode to a standby mode in response to detected degradation of the received optical signal;

- wherein the standby mode includes transmitting data in a radio frequency (RF) signal through a free-space RF path of the communication link.

42. An apparatus in accordance with claim 41, wherein the optical transceiver is further configured to update a control packet based on an assessed characteristic of the received optical signal.

43. An apparatus in accordance with claim 41, wherein the interface circuitry is further configured to

determine whether or not there is detected degradation of the received optical signal based on a control packet updated by the optical transceiver.

44. An apparatus in accordance with claim 41, wherein the optical transceiver is further configured to use an assessed characteristic of the received optical signal to calculate a power adjustment for a station at an opposite end of the communication link.

45. An apparatus in accordance with claim 41, wherein the optical transceiver is further configured to transmit data in the optical signal through a free-space optical path of the communication link that is subjected to atmospheric conditions.